

Separating Xcold, Xhot

JG

4/26/10

Now separate x-exponential into hot side and cold side, see if we get consistency when just one decay parameter is used

$$FCN = \theta(7,i)\{\exp(-\alpha_{x,hot}(i-1) + \exp(-\alpha_y(j-1)) - 1\}$$
$$+ \beta * \theta(i,8)\exp(-\alpha_{x,cold}(i-1))$$

“xbins” here count from hot side to cold side, not necessarily corresponding to the grid written on the paddles.

i is xbin,

j is ybin

β the barrier term to simulate the scintillator discontinuity in middle of paddle
(we expect it to be < 1)

L PMT Results

PMT	$\alpha_{x,\text{hot}}$	$\alpha_{x,\text{cold}}$	α_y	β
1L	0.217	0.205	0.089	0.407
3L	0.251	0.239	0.072	0.462
4L	0.155	0.253	0.139	0.493
5L	0.113	0.303	0.080	1.817
7L	0.155	0.243	0.070	0.850
8L	0.136	0.288	0.076	1.388
9L	0.115	0.299	0.063	1.813
10L	0.142	0.262	0.057	1.005
11L	0.135	0.303	0.146	0.746
12L	0.114	0.223	0.076	0.933
13L	0.105	0.263	0.095	1.097
14L	0.134	0.278	0.088	1.083
15L	0.102	0.229	0.062	0.994
16L	0.140	0.213	0.066	0.866

R PMT Results

PMT	$\alpha_{x,\text{hot}}$	$\alpha_{x,\text{cold}}$	α_y	β
1R	0.197	0.273	0.096	0.768
3R	0.210	0.264	0.103	0.547
4R	0.155	0.363	0.123	1.623
5R	0.139	0.249	0.062	0.971
7R	0.145	0.258	0.066	1.296
8R	0.159	0.261	0.085	0.893
9R	0.131	0.258	0.085	0.974
10R	0.131	0.314	0.091	1.677
11R	0.094	0.421	0.208	3.052
12R	0.117	0.244	0.042	1.345
13R	0.105	0.329	0.066	2.356
14R	0.099	0.330	0.078	2.324
15R	0.096	0.313	0.018	2.585
16R	0.094	0.337	0.076	2.582

- For comparison, the next two slides are the original fit numbers I reported by fitting the x-dependence for only one x-decay parameter.

L PMT Results

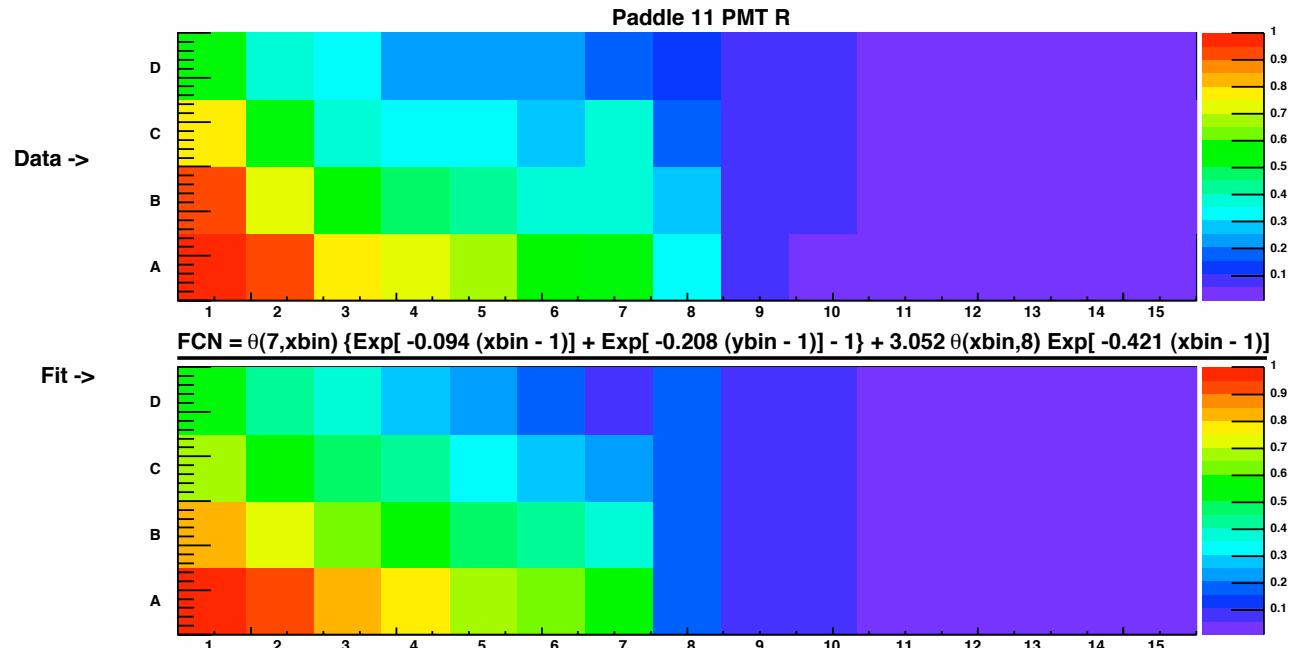
PMT	α_x	α_y	β
1L	0.217	0.090	0.456
3L	0.251	0.072	0.517
4L	0.157	0.136	0.191
5L	0.119	0.074	0.275
7L	0.159	0.067	0.370
8L	0.141	0.072	0.317
9L	0.121	0.057	0.292
10L	0.146	0.053	0.316
11L	0.138	0.143	0.144
12L	0.118	0.071	0.321
13L	0.110	0.090	0.230
14L	0.138	0.083	0.266
15L	0.106	0.057	0.283
16L	0.143	0.063	0.359

R PMT Results

PMT	α_x	α_y	β
1R	0.199	0.094	0.378
3R	0.221	0.102	0.332
4R	0.159	0.119	0.218
5R	0.143	0.058	0.336
7R	0.150	0.061	0.439
8R	0.163	0.082	0.338
9R	0.135	0.081	0.284
10R	0.136	0.086	0.279
11R	0.098	0.202	0.108
12R	0.123	0.036	0.392
13R	0.111	0.059	0.249
14R	0.105	0.071	0.226
15R	0.104	0.010	0.296
16R	0.100	0.070	0.223

- The barrier term β and the x-dir cold decay parameter $\alpha_{x,\text{cold}}$ seem to be degenerate - you can get a high (> 1) barrier coefficient term and can make up for it with a stronger $\alpha_{x,\text{cold}}$.
- Minuit confirms, reporting the correlation between these two parameters are 98% for the vast majority of the fits.
- A barrier coefficient term > 1 is certainly unphysical, I think we should stick to one x-decay parameter for the entire map.
- See next page for example of fit with a barrier term > 1

11R - barrier
coefficient term
= 3.052, much higher
than is reasonable.



If interested please see
<http://home.fnal.gov/~grange/MINERvAmisc/2DFitPaddleMaps/SepXcoldXhot/>
 for all other plots

